

AD 718581

Material Test Procedure 6-3-189
U. S. Army Artillery Board

1 May 1968

3462
U. S. ARMY TEST AND EVALUATION COMMAND
COMMODITY SERVICE TEST PROCEDURE

WIND MEASURING EQUIPMENT, SURFACE

1. OBJECTIVE

The purpose of this MTP is to describe the methods, techniques, and test requirements necessary for the determination of the degree to which surface wind measuring equipment can perform the mission prescribed for it in the applicable Qualitative Materiel Requirements (QMR) and Technical Characteristics (TC), and its suitability for use by the Army.

2. BACKGROUND

The effects of surface (0-200 feet) winds are of interest and concern to U. S. Army personnel in three major areas:

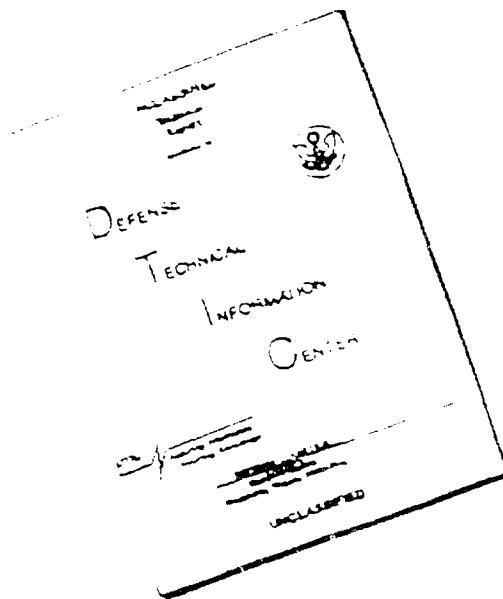
- a. Computing free flight rocket firing data. Low level winds are encountered by a rocket during the initial, or powered, portion of the flight, causing the rocket to cock into the wind. The measurement of low level winds, and the corrections applied, are accomplished by the crew at the rocket launcher position just prior to firing. Since low level winds are subject to frequent and unpredictable change, it is of utmost importance that wind measurement and application of corrections be held to the minimum time attainable.
- b. Providing accurate landing and takeoff information at airfields.
- c. Computing wind chill data for cold weather protection of personnel.

3. REQUIRED EQUIPMENT

- a. Suitable Test Sites and Facilities, for conducting the applicable subtests.
- b. Maintenance Support Facilities, as required.
- c. Communications Equipment and Facilities, as required.
- d. Vehicles for Transporting of Test Equipment and Personnel, as required.
- e. "Standard" Item, for comparison, as required.
- f. Acoustic Aids
- g. Optical Instruments
- h. Electronic Ranging Instruments
- i. Camouflage Materials, as required
- j. Aerial Cameras with film
- k. Aerial Photo Interpretation Facilities
- l. Repair Parts, as required
- m. Road Test Courses, as follows:
 - 1) Paved roads
 - 2) Unpaved roads
 - 3) Cross-country terrain

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n. Equipment and Facilities, as required by the referenced MTP's

4.

REFERENCES

- A. USAMC Regulation 385-12, Safety.
- B. USATECOM Regulation 385-6, Safety Release.
- C. USATECOM Regulation 385-7, Safety Confirmation.
- D. USATECOM Regulation 750-15, Maintenance of Supplies and Equipment.
- E. DA Field Manual 6-15.
- F. MTP 6-3-500, Physical Characteristics.
- G. MTP 6-3-501, Technical Inspection.
- H. MTP 6-3-502, Personnel Training Requirements.
- I. MTP 6-3-504, Ease of Installation, and/or Rigging and Operation.
- J. MTP 6-3-505, Emplacement, Action, and March Order.
- K. MTP 6-3-506, Durability.
- L. MTP 6-3-509, Effects of Weather.
- M. MTP 6-3-517, Electrical Power Requirements.
- N. MTP 6-3-523, Safety.
- O. MTP 6-3-524, Maintenance Evaluation.
- P. MTP 6-3-525, Human Factors.
- Q. MTP 7-3-512, Air Drop Capability (Suitability of Equipment For).
- R. MTP 7-3-515, Air Transport, Internal (Suitability of Equipment For).
- S. MTP 7-3-516, Air Transport, External (Suitability of Equipment For).
- T. MTP 10-3-500, Pre-Operational Inspection and Physical Characteristics.
- U. MTP 10-3-501, Operator Training and Familiarization.
- V. MTP 10-3-502, Durability.
- W. MTP 10-3-504, Maintenance Evaluation.
- X. MTP 10-3-505, Human Factors Engineering,
- Y. MTP 10-3-507, Safety Hazards.
- Z. MTP 10-3-510, Logistics Over-the-Shore (LOTS).

5. SCOPE

5.1 SUMMARY

This MTP describes the methodology, techniques, and the tests required for the determination of the man-equipment compatibility, and the capability and suitability of the test item as a low level wind measuring instrument. The major areas and their included subtests are:

a. Pre-Test Operations consisting of:

- 1) Technical Inspection - A check to verify that the test item is complete and in satisfactory condition prior to the start of testing.

- 2) Physical Characteristics - A verification of the physical characteristics of the test item.
- 3) Electrical Characteristics - A study to ascertain the test item's electrical characteristics and a determination of its power requirements.

b. Operational Characteristics consisting of:

- 1) Emplacement, Preparation for Action, Operation, and March Order Suitability - A study to determine the ability of service personnel to set up the test item for operation under various conditions, operate and to restore it to its transport configuration.
- 2) Measurement Accuracy - A study to determine degree of accuracy of measurement that the test item is capable of as compared to a "standard" item.

c. Transportability Tests consisting of:

- 1) Surface Transportability - A study to determine the suitability of the test item for surface transport.
- 2) Air Transportability - A study to determine the suitability of the test item for transport by aircraft both internally and externally.
- 3) Air Drop Capability - An evaluation of the suitability of the test item for air drop operations.
- 4) Logistics Over-the-Shore - A study to determine the capability of the test item to withstand logistics over-the-shore operations and its suitability for such operations.

d. Vulnerability to Detection - A study to determine the degree of security from aural and visual detection that the test item has in its various modes. Ground and aerial observations are included.

e. Compatibility with Related Equipment - A study to determine the suitability of the test item for operations with its related equipment in various configurations.

f. Full-Test Evaluations consisting of:

- 1) Durability - An evaluation of the capability of the test item to withstand being transported over various types of terrain for a specified number of miles.
- 2) Maintainability and Reliability - An evaluation to determine the suitability of the test item to be maintained, the adequacy of its maintenance package, and its overall ability to operate over long periods of time without adjustment or replacement of components.
- 3) Effects of Weather - An evaluation of the effects of various weather conditions on the operability of the test item.
- 4) Human Factors - An evaluation of the suitability of the test item for operation, servicing, transport and storage

by service personnel without causing undue fatigue and mental errors.

5) Safety - An evaluation of the safeness of the test item in its various configurations, under a variety of conditions, and the resultant safety hazards to service personnel.

g. Post-Test Inspection - A repetition of the technical inspection to determine any adverse effects of testing on the test item.

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Scheduling

6.1.1.1 Personnel

a. Ensure the availability of service personnel who have been trained according to the criteria of MTP 6-3-502 and MTP 10-3-501 and are knowledgeable about the following aspects of the test item:

- 1) Installation
- 2) Operation
- 3) Maintenance

b. Record the following for all service personnel:

- 1) Rank
- 2) MOS
- 3) Training time
- 4) Experience

NOTE: Test personnel shall receive the minimum essential individual instruction in the operation and organizational, direct support, and general support maintenance of the test item. The achievement of a skill level to operate the test item under simulated combat conditions shall be a requirement, assuming that the test item can achieve results as set forth in the applicable QMR. Observations of operations and maintenance activities shall be made by technically qualified personnel.

c. Ensure that experienced personnel are available for the duration of testing.

6.1.1.2 Facilities and Equipment

a. Select and schedule the use of testing sites and facilities as required by the applicable subtests.

b. Upon notice of the arrival or estimated time of arrival of the

test item, arrange for or secure the following:

- 1) Engineering safety release or a safety statement from the engineering agency as prescribed by references 4B and 4C.
- 2) Vehicles for transporting the test item, as applicable.
- 3) Maintenance support facilities, organization, and personnel.
- 4) Assistance of the U. S. Army Airborne, Electronics and Special Warfare Board (USAESWBD), as required, during the conduct of aerial delivery and air drop operations.
- 5) Assistance of the U. S. Army General Equipment Test Activity (USAGETA), as required, during the conduct of logistics over-the-shore operations.

6.1.2 Safety

a. Verify that the test item safety statement is valid and up-to-date.

b. Verify that all service test personnel have been adequately trained in the safety requirements pertaining to the test item and the testing.

6.1.3 Pre-Test Operations

6.1.3.1 Technical Inspection

Conduct a technical inspection of the test item as described by the applicable sections of MTP 6-3-501 and MTP 10-3-500.

6.1.3.2 Physical Characteristics

Determine the physical characteristics of the test item as described by the applicable sections of MTP 6-3-500 and MTP 10-3-500.

6.1.3.3 Electrical Characteristics

Determine the electrical characteristics and power requirements of the test item as described by the applicable sections of MTP 6-3-517.

6.2 TEST CONDUCT

a. Subtests shall be conducted concurrently with, or in conjunction with other subtests, whenever possible, so that the time taken to collect the required data can be minimized.

b. Subtests shall be conducted under the conditions of weather prevailing during the period of testing.

6.2.1 Operational Characteristics

At the completion of each subtest for the evaluation of operational characteristics the test item shall be subjected to a technical inspection as

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described by the applicable sections of MTP 6-3-501 and MTP 10-3-500.

6.2.1.1 Daylight Conditions

Perform paragraphs 6.2.1.1.1 and 6.2.1.1.2 under daylight conditions.

6.2.1.1.1 Emplacement, Preparation for Action, Operation, and March Order Suitability - Determine the suitability of the test item for being emplaced, prepared for action, operated, and march ordered according to the criteria of MTP 6-3-505 and MTP 6-3-504, as applicable.

NOTE: This subtest shall be performed in conjunction with other operational subtests, as applicable.

6.2.1.1.2 Measurement Accuracy - Perform the following using a test item and a "standard" item emplaced at the same site at the same height as the test item.

NOTE: A "standard" item shall be surface wind measuring equipment presently in use.

- a. Determine and record the low level wind velocity and direction over a 24-hour period.
- b. Repeat the determinations until a minimum of three 24-hour test periods have been run.
- c. Record the following for each run:

- 1) Item identity
- 2) Run number

6.2.1.2 Darkness (Blackout) Conditions

Repeat paragraphs 6.2.1.1.1 and 6.2.1.1.2 under darkness (blackout) conditions.

6.2.2 Transportability Tests

6.2.2.1 Surface Transportability

- a. Determine the surface transportability of the test item as described by the applicable sections of MTP 6-3-510 and MTP 10-3-503.
- b. At the completion of the testing, subject the test item to a technical inspection as described by the applicable sections of MTP 10-3-500 and MTP 6-3-501.

6.2.2.2 Air Transportability

NOTE: The conduct of air transportability testing shall be coordinated with the U. S. Army Airborne, Electronics and Special Warfare Board (USAAESWBD).

6.2.2.2.1 Internal Transport - Perform the following:

- a. Determine the suitability of the test item for internal air transport as described by the applicable sections of MTP 7-3-515.
- b. At the completion of the testing, subject the test item to a technical inspection as described by the applicable sections of MTP 6-3-501 and MTP 10-3-500.

6.2.2.2.2 External Transport - Perform the following:

- a. Determine the suitability of the test item for external air transport as described by the applicable sections of MTP 7-3-516.
- b. At the completion of the testing, subject the test item to a technical inspection as described by the applicable sections of MTP 6-3-501 and MTP 10-3-500.

6.2.2.3 Air Drop Capability

- a. Determine the suitability of the test item for air drop operations as described by the applicable sections of MTP 7-3-512.

NOTE: The conduct of airborne operations shall be the responsibility of the U. S. Army Airborne, Electronics and Special Warfare Board (USAAESWBD).

- b. At the completion of the testing, subject the test item to a technical inspection as described by the applicable sections of MTP 6-3-501 and MTP 10-3-500.

6.2.2.4 Logistics Over-the-Shore

- a. Determine the capability of the test item for logistics over-the-shore as described by the applicable sections of MTP 10-3-510.

NOTE: Logistics over-the-shore requirements shall be coordinated with the U. S. Army General Equipment Test Activity (USAGETA).

- b. At the completion of testing, subject the test item to a technical inspection as described by the applicable sections of MTP 6-3-501 and MTP 10-3-500.

6.2.3 Vulnerability to Detection

6.2.3.1 Daylight Condition - Perform the following:

- a. Determine and record the maximum distance at which the test item and its associated power equipment are audible to:

- 1) Unaided ear
- 2) Acoustic aids

b. Determine and record the maximum distances at which the test item is discernible without camouflage and with camouflage from ground positions using:

- 1) Unaided vision
- 2) Optical instruments
- 3) Electronic instruments

c. Determine and record the maximum attitudes at which the test item is discernible without camouflage and with camouflage from aerial observations using:

- 1) Unaided vision
- 2) Optical instruments
- 3) Aerial photography

NOTE: The conduct of airborne operations shall be the responsibility of the U. S. Army Airborne, Electronics, and Special Warfare Board (USAAESWBD).

6.2.3.2 Darkness (Blackout) Conditions

Repeat paragraph 6.2.2.5.1 under conditions of darkness (blackout).

6.2.4 Compatibility with Related Equipment

Determine the compatibility of the test item with related components and devices as described by the applicable sections of MTP 6-3-512.

6.2.5 Full Test Evaluations

During the conduct of this MTP, the following characteristics shall be determined and/or evaluated.

6.2.5.1 Durability

a. Determine the durability of the test item as described by the applicable sections of MTP 6-3-506 and MTP 10-3-502.

NOTE: The test item shall be transported over paved roads, unpaved roads, and cross-country terrain for a minimum of 300 miles, in all transportable configurations.

b. Evaluate the ability of the test item transit case(s) to protect the test item from shock and vibration.

6.2.5.2 Maintainability and Reliability

NOTE: The overall evaluation of the maintainability and reliability of the test item shall be made according to the criteria of

reference 4D.

- a. Complete the authorized maintenance tasks in accordance with the test item maintenance instructions and technical literature.
- b. Determine the maintainability of the test item as described by the applicable sections of MTP 6-3-524 and MTP 10-3-504.
- c. Record the following, as applicable:
 - 1) Time and number of personnel required to perform scheduled and non-scheduled maintenance tasks on the test item.
 - 2) Frequency of repairs.
 - 3) Test item down-time (cumulative)
 - 4) Nomenclature of repair parts used.
- d. Evaluate the adequacy and accuracy of the test item maintenance package.

6.2.5.3 Effects of Weather

- a. Determine the effects of weather on the test item operability as described by the applicable sections of MTP 6-3-509.
- b. Evaluate the ability of the test item transit case(s) to protect the test item from moisture, dust and other debris.

6.2.5.4 Human Factors

- a. Determine the suitability of the test item design with respect to the man-equipment relationship as described by the applicable sections of MTP 6-3-525 and MTP 10-3-505.
- b. Determine and record the suitability and the compatibility of the test item with the service personnel who will operate and service it, with respect to their skills, aptitudes, and physical limitations.

NOTE: Each test item detail requiring human attention and/or manipulation shall be observed and evaluated.

6.2.5.5 Safety

- a. Determine the test item safety hazards resulting from storage, transport, operation and maintenance as described by the applicable sections of MTP 6-3-523 and MTP 10-3-507.
- b. Prepare a safety confirmation in accordance with USATECOM Regulation 385-7.

6.2.6 Post-Test Inspection

Upon completion of testing, the test item shall be subjected to a technical inspection as described by the applicable sections of MTP 6-3-501 and MTP 10-3-500. Any deleterious effects on the test item, due to the testing program, shall be recorded.

6.3 TEST DATA

6.3.1 Preparation for Test

6.3.1.1 Personnel

Record the following for all service personnel:

- a. Rank
- b. MOS
- c. Training time, in months
- d. Experience, in years

6.3.1.2 Pre-Test Operations

6.3.1.2.1 Technical Inspection -

Record data as collected under the applicable sections of MTP 6-3-501 and MTP 10-3-500.

6.3.1.2.2 Physical Characteristics

Record data as collected under the applicable sections of MTP 6-3-500 and MTP 10-3-500.

6.3.1.2.3 Electrical Characteristics -

Record data as collected under the applicable sections of MTP 6-3-517.

6.3.2 Test Conduct

6.3.2.1 Operational Characteristics

Record the following for each subtest conducted:

- a. Visibility condition (daylight, darkness)
- b. Test item nomenclature
- c. "Standard" item nomenclature, as applicable

6.3.2.1.1 Emplacement, Preparation for Action, Operation, and March Order Suitability -

a. Record data as collected under the applicable sections of MTP 6-3-505 and MTP 6-3-504.

b. Record technical inspection data, collected as described in the applicable sections of MTP 6-3-501 and MTP 10-3-500.

6.3.2.1.2 Measurement Accuracy -

a. Record the following for each test run:

- 1) Wind velocity, in mph
- 2) Wind direction, in degrees (with reference noted)
- 3) Item identity (test item, "standard" item)
- 4) Run number (1, 2, 3)

b. Record technical inspection data, collected as described in the applicable sections of MTP 6-3-501 and MTP 10-3-500.

6.3.2.2.1 Surface Transportability -

- a. Record data as collected under the applicable sections of MTP 6-3-510 and MTP 10-3-503.
- b. Record technical inspection data, collected as described in the applicable sections of MTP 10-3-500 and MTP 6-3-501.

6.3.2.2.2 Air Transportability -

a. For internal transport:

- 1) Record data as collected under the applicable sections of MTP 7-3-515.
- 2) Record technical inspection data, collected as described in the applicable sections of MTP 6-3-501 and MTP 10-3-500.

b. For external transport:

- 1) Record data as collected under the applicable sections of MTP 7-3-516.
- 2) Record technical inspection data, collected as described in the applicable sections of MTP 6-3-501 and MTP 10-3-500.

6.3.2.2.3 Air Drop Capability -

- a. Record data as collected under the applicable sections of MTP 7-3-512.
- b. Record technical inspection data, collected as described in the applicable sections of MTP 6-3-501 and MTP 10-3-500.

6.3.2.2.4 Logistics Over-the-Shore -

- a. Record data as collected under the applicable sections of MTP 10-3-510.
- b. Record technical inspection data, collected as described in the applicable sections of MTP 6-3-501 and MTP 10-3-500.

6.3.2.3 Vulnerability to Detection

a. Record the following for each aural observation:

- 1) Visibility condition (daylight, darkness)
- 2) Maximum distances, in meters, at which the test item and

associated equipment can be detected by:

- a) Unaided ear
- b) Acoustic aids

3) Test item operational condition (operational, standby)

b. Record the following for each visual observation from ground positions:

- 1) Visibility condition (daylight, darkness)
- 2) Test item emplacement condition (camouflaged, uncamouflaged)
- 3) Maximum distances, in meters, at which the test item is discernible by:

- a) Unaided vision
- b) Optical instruments
- c) Electronic instruments

c. Record the following for each visual observation from aircraft:

- 1) Visibility condition (daylight, darkness)
- 2) Test item emplacement condition (camouflaged, uncamouflaged)
- 3) Maximum altitudes, in feet, at which the test item can be detected by:
 - a) Unaided vision
 - b) Optical instruments
 - c) Aerial photography

6.3.2.4 Compatibility with Related Equipment

a. Record data as collected under the applicable sections of MTP 6-3-512.

b. Record technical inspection data, collected as described in the applicable sections of MTP 6-3-501 and MTP 10-3-500.

6.3.2.5 Full-Test Evaluations

6.3.2.5.1 Durability -

Record data as collected under the applicable sections of MTP 6-3-506 and MTP 10-3-502.

6.3.2.5.2 Maintainability and Reliability -

Record the following:

a. Data as collected under the applicable sections of MTP 6-3-524 and MTP 10-6-504.

b. Type of maintenance performed (scheduled, non-scheduled).

- c. Time required to perform each maintenance task, in hours.
- d. Number of personnel required to perform each maintenance task.
- e. Frequency of repairs over the period of testing (record dates).
- f. Test item down-time (cumulative), in hours.
- g. Nomenclature of repair parts used.

6.3.2.5.3 Effects of Weather -

Record data as collected under the applicable sections of MTP 6-3-509.

6.3.2.5.4 Human Factors -

Record the following:

- a. Data as collected under the applicable sections of MTP 6-3-525 and MTP 10-3-505.
- b. Observations of service personnel during testing, and the suitability of the test item with respect to their:
 - 1) Skills
 - 2) Aptitudes
 - 3) Physical limitations

6.3.2.5.5 Safety -

Record data as collected under the applicable sections of MTP 6-3-523 and MTP 10-3-507.

6.3.2.4 Post-Test Inspection

- a. Record data as collected under the applicable sections of MTP 6-3-501 and MTP 10-3-500.
- b. Record any deleterious effects of the test program on the test item.

6.4 DATA REDUCTION AND PRESENTATION

Data obtained from all subtests covered by applicable MTP's shall be summarized, compared with "standard" data and evaluated according to procedures described in those applicable MTP's. Appropriate charts, graphs, and tabulated summaries shall be used to present the data in a clear manner. Special consideration shall be given to any condition or circumstance contributing to any test result.

Calculations shall be performed as specified by the individual MTP's, wherever applicable, and all photographs, motion pictures and illustrative material, shall be suitably identified.

The evaluation of the test item measurement accuracy shall be based on the summarized data and on the comparison with data produced by the "standard"

item.

The qualitative and quantitative data collected shall also be evaluated in terms of the requirements specified in the QMR's and TC's which are applicable, to determine the degree of fulfillment of the test item performance specifications.

For the evaluation of the vulnerability of the test item to detection average distances and altitudes shall be computed, tabulated, and compared for the various observation methods under the various conditions.

A safety confirmation based on the data of paragraph 6.3.2.5.5 shall be presented in accordance with USATECOM Regulation 385-7.